The Role of Community Colleges and Industry in Meeting the Demand for Skilled Production Workers and Technicians in the 21st Century Economy

Written Statement

Of

Gerald Pumphrey, Ed.D.

President, South Puget Sound Community College

Before the
House of Representatives
Subcommittee on Research and Science Education
June 19, 2007
3:00 PM

What factors are involved in a decision by a community college when deciding whether to develop or continue a tech-training program in a particular field? How does the college evaluate the potential impact of the program in comparison to its associated costs? What are the biggest challenges faced by a community college in either initiating or continuing a program with low enrollment?

Good afternoon, Chairman Baird, Ranking Member Ehlers, and members of the Subcommittee on Research and Science Education. I thank you for the opportunity to testify before your Subcommittee today. My name is Gerald Pumphrey, and I am President of South Puget Sound Community College. It is my privilege to speak with you today on the topic of technician education. It is a topic within my experience at four community and technical colleges in the states of Washington and North Carolina, and as a consultant within the Program Development Services section of the State Board for Community Colleges in North Carolina.

Community and technical colleges initiate technical training programs in response to employment demand, most often in the geographic region they serve. Employment demand often results from the growth of an industry and thus job openings within it. Also, the pending wave of retirements by baby boomers will require replacement of skilled workers in many technical occupations. In other cases, increasing sophistication of technology will require retraining of incumbent workers and a higher level of education for entry-level workers. A sustainable and sufficient level of job openings for graduates is a necessary condition for any successful technical education program. Programs that serve a cluster of similar or related industries are usually more stable than one that serves a single large industry.

Prior to starting a new program, community and technical colleges will verify that career entry into the targeted occupation or range of occupations requires education and skills that are appropriate to a certificate or an associate degree. If these knowledge and skill

requirements are minimal, the college may explore a customized skill training approach rather than a full program with permanent facilities, equipment, and faculty. If the program demands more extensive theoretical preparation and skill development than can be provided at the associate degree level, the college may partner with a university or pass up the opportunity altogether.

As a condition for creating a new program, colleges will assess the potential for student enrollment demand, sometimes directly through surveys of high school students, groups of incumbent workers, or unemployed workers. This phase of exploration usually includes a study of potential starting wages and career progression opportunities. If there is no positive differential in the starting wage of a training program graduate, student demand for the training is likely to be suppressed. Likewise, the ability to advance in the career by initial hiring is a positive indicator for starting a new technical education program.

If the college is governed by a state board or other program approval authority, it may be required to demonstrate that initiating a new program is not unduly competitive with similar programs at other colleges in its geographic proximity. The college may take under consideration whether a new program will have a synergistic or competitive relationship with its own existing programs. Often, a college will weigh the prospects of success for the proposed program and the potential benefit it offers its community. If the proposed program is understood to be critical to local economic development or services in the community, the college may engage in intense political activity on its own campus or before the body that has authority to approve the program.

Ideally, curriculum will be designed in conjunction with industry partners. Other considerations in curriculum development potentially include requirements for external program-level accreditation, industry-wide skill standards, and licensure standards for graduates, etc. Close collaboration with industry at this stage of program design is essential to successful technician education.

The academic and technical curriculum content drives requirements for faculty, facilities, and equipment. As technology becomes more specialized and advanced, colleges can face difficulty in finding and affording qualified faculty. Colleges may face constraints in the availability of classroom/laboratory space, particularly when programs require specialized electrical, mechanical, or data connections. Colleges vary widely in their ability to acquire and maintain sophisticated equipment, and the rapid evolution of technology makes this a particularly daunting task. Some technician education programs experience high costs for consumable supplies, utilities, and software licensing agreements.

Before making a decision to implement a new program, the college must determine if it can muster the operating and capital funds to sustain it. Sources often include revenue from state funding, tuition, fees, and external training contracts. Colleges often face multiple, simultaneous opportunities to develop technical education programs, and usually must engage in a comparative cost analysis and reach some judgment concerning

opportunity costs. In many cases, support from the relevant industry is essential to start and continue operation of the program.

What factors influence the low enrollment of tech-training programs? How can low enrollment be remedied? What efforts do your and other colleges make to attract the widest possible population of students to tech-training?

Low enrollment in technical training programs can result from a variety of external and internal factors. Among the external causes, the perception of a lack of employment opportunities can be a strong influence. In 2007, many colleges' information technology programs are only now recovering from enrollment declines that followed the recession in that industry after 2001. If it is possible to begin a career without technical education, or if having that technical education secures no wage advantage, fewer students will enroll in a training program. Sometimes, students perceive that better opportunities are available in a more dominant or more visible industry, leaving both viable jobs and the training programs that support them behind.

In some cases, factors internal to the college can have a negative influence on enrollment in technician education programs. If the college is unable to identify a target student population and market the program effectively, enrollment may suffer. If, over time, the college allows its facilities and equipment to become obsolete, enrollment will decline. If the program faculty do not maintain their own technological currency, or if their teaching skills decline, students will not continue to participate. These issues highlight the critical importance of maintaining strong, industry-based advisory committees for each of the college's technical programs.

Community and technical colleges employ a variety of strategies to attract students to technical education programs. Most work with the high schools in their service areas to connect related secondary career and technical education programs with college programs in similar disciplines. These connections are often made within the context of Tech Prep articulation agreements that give the high school student advanced placement credit for college-level work. Many colleges engage in a variety of other high school outreach programs in which college recruiters present programs for high school students and parents, along with workshops for teachers and counselors. Some colleges offer summer camps for middle and high school students to provide them exposure to technical or scientific careers. The last two colleges for which I have worked have held fairs to provide exposure for women to nontraditional careers in the trades or technical careers. In both colleges, we have had active referral systems in place with our regional WIA one-stop centers. In my experience, two factors are worthy of note. First, employers and their representatives usually have a higher impact on recruitment for training programs related to their industries than do college personnel. Second, community and technical colleges rarely have sufficient funding for effective marketing.

What challenges does inadequate math/science preparation pose to tech-training programs? Do you know of colleges engaged in innovative ways of addressing this dilemma, particularly through collaborating with secondary schools?

The fact that nearly half of the students entering community and technical colleges require at least some remediation in mathematics is a multi-dimensional problem for the colleges. Remedial or developmental education clearly diverts resources from college-level programming. These pre-college courses are typically funded by the states at a lower value per full-time equivalent student than college-level courses. This dilutes the funding stream and financial health of the institutions. The greater the length of time a student spends in remedial or developmental courses, the less likely she or he is to matriculate into and complete a college program.

To the extent a student's remediation is incomplete or imperfect, the technical education curriculum is invariably diluted. As a case in point, I was once summoned to a pharmacology class by the department chair of a medical assisting program. Her colleague was engaged in a laborious process of teaching the students long division of decimals for the purpose of calculating drug dosages. As frightening as this revelation was, there was also an undeniable shortchanging of the intended pharmacological content.

Washington state has a promising initiative to improve the ability of high school students to enter college-level mathematics courses without remediation. The Math Transitions Project is built on a detailed curriculum analysis and defines competency-based standards for college readiness in mathematics. The standards and additional information about the project are available at http://www.transitionmathproject.org.

What is an industry partner's ideal role in a community college tech-training program? Please elaborate on your experiences with industry partners.

Once the determination is made that employment opportunities and student enrollment demand are sufficient to sustain a technical education program, a college and the supporting industry can begin the detailed work of creating a partnership. Curriculum development presents an early opportunity. In the past, I have worked with technicians, front-line supervisors, human resource professionals, industrial trainers, and engineers to create curriculum for educating computer-aided machine operators and programmers (Outboard Marine Corporation, Burckardt Amerida, Amp, Inc.), chemical process technicians (Dow Corning, Proctor & Gamble, Stockhausen, Ciba Specialty Chemicals), and process operators (Conoco-Phillips, BP, Shell, Tesoro.) In most cases, we used source documents from National Science Foundation-funded Centers of Advanced Technology, or from organizations promulgating skills standards (National Institute for Metalworking Skills) as a starting point. We often prioritized, selected, and occasionally modified these curriculum materials to fit local needs. When working with multiple industrial partners, the process often involves reaching a consensus on the content needs shared by all the partners and an agreement that any additional proprietary training be

done in-house after hiring. Collaboration among the college and its industrial partners on curriculum design is a fundamental building block of a successful partnership.

While developing a program in Chemical Process Technology at Guilford Technical Community College in Greensboro, North Carolina, a group of engineers from the participating companies identified nine unit operations that their future employees needed to perform. Using standardized connections, they designed modular units for each of these processes, facilitating interchangeable sequencing and simulating manufacturing of a variety of products. These engineers produced CAD files of this modular equipment and the laboratory space that the college planned to renovate for use by the new program. They secured substantial donations of pumps, valves, and other components from surplus inventory in their plants. They worked with their purchasing managers to leverage deep discounts for remaining equipment purchased by the college. The result was a laboratory that supported the curriculum and was flexible enough to meet the needs of both career-entry trainees and the companies' incumbent work forces. Dow Corning provided a two-for-one matching grant to cover the hard cash costs of the project.

Conoco-Phillips, BP, Shell, and Tesoro provided similar assistance with the development of a Process Technology program at Bellingham Technical College in Bellingham, Washington. Industry support for that program and a related one in Instrumentation and Process Control Technology led to the college's designation by the state as a Center of Excellence in Process Manufacturing.

One of the most productive models for a partnership between community and technical colleges and an industry is the approach to service technician training developed first by General Motors and now shared by most automotive manufacturers. As microprocessor technology spread throughout a host of automotive applications, General Motors foresaw the need for a higher level of theoretical preparation for the technicians who serviced its products in the dealerships. They developed a program that is structured with alternating periods of study and practice on campus and periods of cooperative education work experience supervised by seasoned technicians in the workplace. The manufacturers have typically supported these programs with donated vehicles and components, technical update training for the faculty, and real time access to the latest technical service databases. At Guilford Technical Community College, both General Motors and Ford contracted with the college to provide update training for dealership technicians. The income from these training contracts was used to further augment the quality of the tools and technology for the career entry programs.

In all of the colleges for which I have worked, we have had a strong system of advisory committees. These committees are constituted by members representing employers and who are close to the evolving skill needs of their workforce. They provide feedback on developments in their industries to keep the programs current. Many are involved in student recruitment and outreach, securing cooperative education work opportunities, and assisting with the placement of graduating students in jobs. They have often assisted in securing donations of equipment and sometimes funding. Many have served as guest speakers for classes or assisted in finding other speakers to do so.

In some rare cases so far limited to the medical industry, I have received help from partners through salary supplements or relocation assistance for faculty in high skill, high wage career fields. At South Puget Sound Community College, we have a three-year contract with Providence St. Peter Hospital to expand our nursing program by an additional class cohort. We would not have been able to respond to their employment needs to the same extent without the contract.

What impacts do shifts in industry demand have on tech-training programs and how do community colleges address these?

There are three principle types of shifts in industry demand that affect technical education programs. Most industries are now on a constant path of technology renewal in attempts to gain competitiveness by increasing productivity, reducing costs, speeding product development cycles, customization of products to customer specifications, or some combination of these efforts. In the face of this accelerating evolution in technology, colleges face increasing difficulty in keeping curriculum current, helping faculty keep their skills up-to-date, and in keeping instructional equipment and software parallel with industry practice. An effective advisory committee can keep a college apprised of the nature and extent of these requirements, but many colleges struggle with the costs of remaining current. The colleges most successful in meeting these demands are those in effective partnerships with industries that participate financially to keep technology in the training environment equivalent to that deployed in the production setting.

The technological evolution has also been accompanied by a large-scale shift by industries to embrace the quality movement, lean manufacturing, and other strategies for improving productivity and quality by empowering employees closest to the work processes to make decisions about them. This has fundamentally changed the goal of most technical education programs from producing workers outfitted with a specific set of skills and a narrowly defined knowledge base toward producing employees with a broader contextual knowledge of an industry, including its technology, production processes, business practices, and the culture of its customer base. Educated technicians are now also expected to be fluent in the use of a variety of information technologies, participate fully in team-based problem solving strategies, and to have a broader knowledge base that allows them to absorb future shifts in production processes and technologies at a minimum expense to the employer for re-training.

These changes in expectations have caused colleges to seek mechanisms for better connecting the student learning experience across academic and technical disciplines. Many colleges have experimented with team teaching and learning communities in which intact cohorts of students enroll in blocks of related courses. Colleges still struggle to an extent to develop tools for assessing cross-functional learning. These types of changes have not been easy to implement within the architecture of college organizational structures and cultures. Most of the colleges have broad missions that include not only technician education, but academic transfer programs, remedial and developmental education, and continuing education that respond to a broad variety of interests in their communities. This breadth of mission, along with the momentum of academic and

institutional cultures, has not created the conditions for many colleges to emulate the organizational structures or thoroughly integrate the quality and productivity tools that have been widely adopted by their industry partners.

The third type of shift in industry demand is directly related to the expansion or contraction of labor market demand. These shifts can arise from industry-wide responses to fluctuation in the business cycle, or from the start-up, expansion, or failure of individual companies. Obviously, these changes have an impact on the demand for graduates, and they also have an impact, sometimes delayed, on student enrollment in related technical education programs.

It is easier for the college to respond to expansions. In some cases, the college can hire an additional instructor and schedule classes in existing facilities during extended hours of the day. In others, the college can respond with highly focused classes to up-skill incumbent workers for promotion into more advanced positions while offering accelerated, customized training for entry-level workers. If the growth in demand is broad across industry sectors and projected to be sustained, the college can plan to rent or build additional capacity. Industries are often much more likely to enter into substantive partnerships with colleges in periods of strong expansion and short labor supply.

Contractions are far more difficult for colleges to deal with. If the industry demand remains strong, but student enrollment is weak, the college will assess the underlying reasons and may choose to develop an action plan. The action plan may involve a renewed marketing effort and/or address fundamental issues of program quality, including the technical or pedagogical skills of the instructor and/or the adequacy of instructional equipment.

Assuming a decline in demand for graduates or by students for enrollment is projected to continue, the college must face the difficult question of whether to continue the program. It is often the case that the college needs to redirect the funding that supports the program in question for responding to a new or different demand. Most often, some students are enrolled in the program and provisions must be made for them to graduate. Faculty contracts often specify detailed procedural requirements for terminating programs. If the positions of tenured faculty are to be eliminated, the process can be lengthy, contentious, and expensive. Often, a residual level of demand continues in the employment sector, but it is too low to sustain a college program. In these situations the college may face vocal opposition to terminating the program from industry representatives allied with the affected faculty. The college may need to make a sound business decision in an unsupportive political environment, but the resistance more often delays than prevents a choice that is ultimately inevitable in the face of inadequate enrollment.